NEWS REPORT

H. D. Gardner

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NEWS REPORT

National Academy of Sciences *National Research Council*

VOLUME IX *November-December 1959* NUMBER 6

International Geophysical Year: A Stimulus to Science Education

HUGH ODISHAW, *Executive Director*

United States National Committee, International Geophysical Year

LONG before the onset of its 18-month period of world-wide observations and measurements, beginning on July 1, 1957, the International Geophysical Year (IGY) had captured the imaginations of young and old alike. In the autumn of 1954 the U. S. Navy sent the U.S.S. *Atka* on its IGY reconnaissance voyage to explore ice pack conditions and to look for coastal station sites in Antarctica. From 1954 on, each Antarctic season saw Navy Task Force 43 in operation with a fleet of icebreakers, cargo ships, and aircraft. Late in 1956 the first groups of IGY Scientists took up their posts in Antarctica. Meanwhile, the announcement of plans for satellite launchings was made by the White House in the summer of 1955. Throughout the period from 1954 to 1957, reports on the IGY appeared in print with increasing frequency. As each new development in the program became known, curiosity and interest in the IGY mounted appreciably.

During this planning period of the IGY, response to public interest was limited to occasional statements, issuance of program documents, reports on meetings, and the like. As the period of intensified studies approached, however, the U. S. National Committee for the IGY, established by the National Academy of Sciences, recognized that the burden of information dissemination was destined to become both large and important. Quite aside from interests of communications media, inquiries from young students and their teachers, especially at the high school level, were mounting. The U. S. Congress itself had taken note, as early as 1956, of the opportunity that IGY afforded the scientific community to stimulate the interest of young people in science.

By 1956 the Academy had taken several steps to serve these educational interests. Speeches, articles, and fact sheets were prepared, and reprints were distributed for use as background to the IGY. A survey of the planned program, entitled "International Geophysical Year," was prepared for the U. S. Senate. Published as Senate Document No. 124, this report had wide circulation and was well received. Later, two special review hearings in the House were also most useful: the first (June 1958) reviewed the first 11 months of the IGY; the second (February 1959) reported on the full period of activity. Both contain geo-

physical information of broad interest, and both were distributed widely and had extensive use.

Meanwhile, beginning in 1956, discussions were held and arrangements made with various educational groups, within and outside of the government, for the orderly flow of factual information to educators. These arrangements included the planning of a series of articles for the National Education Association and the National Science Teachers Association and a series of pamphlets for the Department of School Services and Publications of Wesleyan University.

Late in 1956 a more extensive program was planned, consisting of three parts: *1)* a poster-brochure project, *2)* a film program, and *3)* a general documentation effort. In these ventures many leading scientists and scientific institutions, public and private, cooperated extensively; and this work still continues, abetted by the extensions of programs patterned after the IGY. Generous support for these efforts was provided by the Ford Foundation, while several pilot studies were financed by the National Science Foundation.

Planet Earth

The poster-brochure project, called "Planet Earth," was completed in November 1958. It has three components: six posters, a brochure for the student, and a project leader's kit. The purpose of "Planet Earth" is several-fold: to excite interest in the geophysical sciences, to suggest the unity of man's knowledge, and to provide informative narration for student and teacher alike. The subjects covered in the project are indicated by the titles of the posters: *Earth, Oceans, Poles, Weather & Climate, Sun & Earth,* and *Space.*

The first objective of "Planet Earth" was to attract and to stimulate. Therefore the posters had to be imaginative and visually pleasing. But because of the equally important objective of conveying substance, factual detail was called for. This combination of goals required a fresh approach. Color and design were used to capture immediate visual response; substantive details, superimposed upon the over-all design, provided richness of content. Thus, from a distance, the appeal of the posters is one of aesthetic as well as general scientific interest; on closer examination, their relative complexity is apparent and affords an index of their content. In effect, a complex of "pegs" is provided in order to provoke questions and to afford the teacher opportunities for discussion. Reports from schools suggest that these two objectives have been realized.

Yet another purpose was in mind in casting the form and substance of the posters. Seeing no schism between the humanities and the sciences, we wished to suggest the unified purpose behind all of man's intellectual activities. For this purpose human figures were woven into the designs, serving to relate man to geophysics and adding the warmth of human shapes to the otherwise cold picture of our physical environment. Moreover, these human figures are often deliberate echoes from mythology and the Renaissance, and each poster proposes its theme through a quotation from a poet, or painter, or prophet. Thus, the poster entitled *Space* has a line from Robert Browning: "Ah, but a man's reach should exceed his grasp, Or what's a heaven for?" Da Vinci's sentence, "The air moves like a river and carries the clouds with it," is used on *Weather and Climate.* For *Sun and Earth,* Job poses two questions: "Knowest thou the ordinances of Heaven? Canst thou set the dominion thereof in the earth?"

The remaining two components of "Planet Earth" consist of pamphlets. One of these is the student brochure, an illustrated, 44-page leaflet. It reproduces the posters and provides commentary for each; text and posters in this brochure are tied together by a number code. The last component is a teacher's kit containing a general introduction to the project, a reading list, a leaflet of classroom experiments, a publication showing how a Baltimore school system utilized the IGY, a collection of articles on various fields of geophysics, and a list of science scholarships for students.

Distribution of "Planet Earth" was begun about the middle of the 1958-1959 academic year. Two promotional mailings to science teachers on the lists of the National Science

Teachers Association were made. As of the end of the academic year, June 1, 1959, some 2700 classrooms had purchased the recommended "package" consisting of a set of six posters, thirty student brochures, and one teacher's kit. All told in this period, about 90,000 student brochures were in the hands of high school students and over 15,000 posters mounted in auditoriums and classrooms. With the help of scientists and educators, we expect to see increased use made of "Planet Earth" during the current academic year.

The general approach used in "Planet Earth," which has also established the character of the film program, may be of some interest. The dominant factor here was the nature of the elementary and high school curricula. No explicit provisions generally exist for courses in geophysics, which largely enter into the curricula through physics and geography. Even in these areas the curricula vary considerably throughout the country, while appreciable time is required to integrate new material into existing courses. For these reasons it was decided that material on geophysics prepared by the Academy should be supplementary and enriching in nature rather than of a specific pedagogical character. It should, in short, complement rather than modify the curricula, and its function would be to inspire, to stimulate, and to assist the teacher in synthesizing information in several fields.

It was also decided that such materials should attempt to present the scientist at work, in the belief that the scientist at work is more meaningful, particularly to the young, than is theory divorced from man. Moreover, this approach would serve to counteract the stereotype of the scientist as a recluse or the scientist as a being separated from the world at large. The IGY, of course, afforded splendid opportunities for this approach because field work, travel, and personal adventure were involved in the program. Moreover, because geophysics deals with man's gross physical environment, an opportunity was at hand to relate the inquiries of science to those of philosophy, religion, and literature. This attempt, as noted earlier, was made most directly in the design of the posters.

It was also decided that educational materials prepared by the Academy should not be restricted to the IGY. Rather, the interest and excitement engendered by the IGY were to be utilized to attract attention to the sciences. For this reason the content in any given field, while utilizing both the results and the interest of the IGY, ranges from early to modern notions and experiments. This approach also means that time need not date the material in the near future.

In arriving at these criteria, we were fortunate in having the advice of many educators and scientists in several public and private institutions. Moreover, Detlev W. Bronk, President of the National Academy of Sciences, appointed an IGY Advisory Committee on Education to assist the staff. Serving on this Committee were the following:

Wallace W. Atwood, Jr., Director, Office of International Relations, National Academy of Sciences
James S. Coles, President, Bowdoin College
Carey Croneis, Provost, Rice Institute
Laurence M. Gould, President, Carleton College
J. Wallace Joyce, Head, Office for Special International Programs, National Science Foundation
Joseph Kaplan, Chairman, U. S. National Committee, IGY
John R. Mayor, Director of Education, American Association for the Advancement of Science
Hugh Odishaw, Executive Director, U. S. National Committee, IGY
Alan H. Shapley, Vice-Chairman, U. S. National Committee, IGY
Randall M. Whaley, Executive Secretary Advisory Board on Education, National Academy of Sciences

Arnold W. Frutkin served as Secretary until September 14, 1959, when John C. Truesdale assumed his duties in the Information and Education Office of the IGY. Execution of the program was assigned to the author of this article. The Committee has met formally on seven occasions, and there have been many informal sessions of groups of the Committee. Members have devoted much time and effort to the program through these sessions and through extensive correspondence.

The Film Series

The second principal activity in the Academy's IGY educational program has

been the film project. This program embraces thirteen 27-minute films covering the principal geophysical fields of interest during the IGY. Here again, the content is not restricted to the IGY, and an attempt is made to synthesize man's knowledge in each area. Ancient ideas are presented in a narration and illustrated through iconography and art work. Extensive film footage was taken in all parts of the world both during and after the IGY, providing the stimulus and interest of field work at home and in faraway places. To demonstrate theoretical principles and to reveal experimental methods not readily accessible to photography, considerable animation is employed.

The scope of the project can be suggested by the following subjects: seismology, gravity, geodesy, oceanography, meteorology, glaciology, solar activity, aurora, radiowaves, cosmic rays, geomagnetism, research using rockets, and space science. It is expected that the project will be finished early in 1960, when the entire series will be made available for distribution. Arrangements for distribution through a variety of media but particularly to schools are now being made. It is planned that the films will be available both in their original color form and in black and white; the sound track includes both narration and music. As with the poster-brochure "Planet Earth" project, the film series will be distributed at cost: reproduction of the materials and distribution expenses. While no effort to amortize production costs is involved, it was felt that subsidized distribution was not in the interest of proper utilization of these materials. Advisors to the Academy concurred that the materials, if in fact valuable, should meet the test of a price at least partially commensurate with reproduction and distribution costs.

Documentation

In addition to the film series and "Planet Earth," the Academy's IGY staff has undertaken a variety of activities of direct interest to young students and their teachers. It has assembled for loan to such persons a still photograph library of approximately 750 subjects; a collection of some 80 motion pictures made by other organizations on IGY-related subjects; 280 slides; and 4 different exhibits on satellites, IGY in general, and "Planet Earth."

Using materials of the above kind, hundreds of addresses have been made by scientists and laymen during the last four or five years. For example, in the 18-month IGY period alone, Academy personnel made 156 talks on IGY matters, and suggested project personnel and other speakers for 98 occasions. Audiences have ranged from scientific groups to youngsters in elementary schools. A particularly notable occasion was the Report on IGY sponsored by the Frontiers of Science Foundation in Oklahoma City on April 3, 1959. An audience of 6,000 selected high school students and their teachers heard leading scientists in the IGY program.

Both radio and television audiences have on scores of occasions received reports on various aspects of geophysics and of the IGY. The IGY staff of the Academy cooperated with the University of Minnesota and the National Educational Television Center in a series of twelve TV programs on the IGY Antarctic program, each dealing broadly with a discipline of science. L. M. Gould directed this series and appeared in each. The series was distributed to 33 educational TV stations. Another series of 10 programs dealing with the IGY was prepared by the Educational Television and Radio Center in cooperation with the National Broadcasting Co. Joseph Kaplan and other scientists participated in these programs, broadcast over 15 educational TV stations and then made available in kinescope form to other stations. Other programs covering IGY material include CBS' "Conquest," Johns Hopkins' "File 7" over ABC-TV and "Time for Science," produced by the Greater Washington Educational Television Association.

During the formal IGY period, the Academy issued 73 press releases on IGY subjects, and held 10 press conferences. The resulting widely published material came to the attention of students and teachers not only through general media such as newspapers and popular magazines but through specialized publications going to schools,

such as *Science News Letter, Current Science, Science World,* and others. Many students and teachers have sought information directly from the Academy. Since the beginning of IGY more than 5000 such inquiries have been handled.

Special assistance was given to many individual writers and editors. This ranged from simple answers to telephone inquiries to assembling by-lined articles of scientists for two special IGY sections of the *New York Herald Tribune*. More than 70 articles were written by staff members for encyclopedias, magazines, and newspapers. One of these articles provided broad coverage of the earth sciences for a large number of students and teachers and was issued as the pamphlet "Science Explores Our World." Covering in 48 illustrated pages the various disciplines studied in the IGY, this was prepared for the Department of School Services and Publications of Wesleyan University, and approximately 250,000 copies in two editions were distributed.

A series of seven articles on IGY activities was prepared for *The Science Teacher,* a publication of the National Science Teachers Association (NSTA) reaching 40,000 science teachers throughout the country. Another series of eight articles was prepared for *Tomorrow's Scientists,* also an NSTA publication, but designed for elementary school classes. Reprints from both were also distributed upon request.

One of the most important means for disseminating information about the IGY has been the *IGY Bulletin,* a monthly publication of a semi-technical nature. Advance copies of the *Bulletin* have been made available regularly to the press. Copies have also been made available to teachers and students on a modest subscription basis. Scientists active in the IGY regularly receive it and its inclusion in the *Transactions* of the American Geophysical Union has made it available to additional thousands of geophysicists around the world. Approximately 15,000 copies of the *Bulletin* are distributed each month; of these, about 1,000 reach students and teachers at the elementary and high school level.

Special events were also considered. In 1958 the Academy's IGY Committee sponsored the participation of a junior astronomer in the Danger Islands Eclipse Expedition. The following year it undertook a similar activity in connection with the Eclipse Expedition to the Canary Islands. A Boy Scout was chosen to serve as a technical aide during the first year of the IGY Antarctic program. These projects were widely reported on—for example, in *Current Science* and *Science World,* as well as in the press and over radio and TV.

While some references have been made to general information activities of the IGY Committee, this summary has touched only upon those few efforts that related rather directly to the educational program. Actually, however, the information activities served the educational interests because the objectives of the former were, in the broadest sense, educationally directed.

SCIENCE NEWS

AUTUMN MEETING NATIONAL ACADEMY OF SCIENCES

The 1959 autumn meeting of the National Academy of Sciences was held November 16–18 at Indiana University, Bloomington, Ind., with approximately 150 members and guests in attendance. Seventy-nine contributed papers were presented at the meeting; in addition, nine invitational papers were presented at symposia on radio astronomy and antibody formation. The scientific sessions, which were open to the public, were held concurrently in the Whittenberger Auditorium and the Distinguished Alumni Room of the new Indiana Memorial Union, situated on the campus. The members met in business session on Monday afternoon, November 16.

Tracy M. Sonneborn, distinguished service professor of zoology at Indiana University and a member of the Academy, delivered the public lecture on Monday evening on "The Gene and Cell Differentiation."

Members of the Academy and their guests were entertained at several events during the three-day meeting. On Monday afternoon, they were received in the President's House by H. B Wells, President of Indiana University, and Mrs. Granville Wells, and on Tuesday afternoon by President and Mrs. Bronk at the Van Orman-Graham Hotel. Following the formal Academy dinner that evening, members and guests attended a concert by the Berkshire Quartet, an accomplished string group in residence at the University.

Merle A. Tuve, Director of the Department of Terrestial Magnetism, Carnegie Institution of Washington, served as chairman of the Tuesday morning symposium on radio astronomy. Papers were presented by J. H. Oort, Leiden Observatory, Holland; Alan Maxwell, Harvard Radio Astronomy Station at Fort Davis, Tex.; R. Minkowski, Mt. Wilson and Palomar Observatories; and Joseph A. Giordmaine, Columbia University.

The Tuesday afternoon symposium on antibody formation was led by William H. Taliaferro, Eliakim H. Moore Distinguished Service Professor of Microbiology, University of Chicago. Papers were presented by David W. Talmage, University of Colorado Medical School; A. H. Coons and A. Fecsik, Harvard University Medical School; F. Haurowitz, M. Richter, and B. Patras, Indiana University; G. J. V. Nossal, Stanford University; and Edwin S. Lennox and Melvin Cohn, University of Illinois and Stanford University Medical School.

ROSS GRANVILLE HARRISON

Biological science lost by the death on September 30, 1959, of Ross Granville Harrison. His life spanned the great development of experimental morphology and embryology, to both of which he contributed in most important ways. When he retired from Yale as Sterling Professor of Biology, he could point to the establishment of Yale zoology as a department known for its excellence both here and abroad. One of the most distinguished scientists that the United States has produced, Dr. Harrison was elected to the National Academy of Sciences in 1913.

He took over the duties of Chairman of the National Research Council in 1938 working with Frank R. Lillie who was then President of the Academy. Lillie was succeeded as President by Frank B. Jewett, who served through the years of World War II and formed with Harrison the combination which guided the war work of the Academy–Research Council which made this combined non-governmental body so valuable as a contributing agency to our National Government. Under Harrison and Jewett, the Academy–Research Council assumed the vigorous role in many facets of our national scientific development that has continued to grow under the subsequent leadership of Alfred N. Richards, William W. Rubey, and Detlev W. Bronk.

The vigor which Jewett and Harrison showed in their attack on war problems was amazing. After a full day in which frequent meetings with government agencies such as Department of Defense, War Manpower, Selective Service, Senate and House Committees were held, Jewett and Harrison would meet at dinner and plan far into the night. The results of these consultations helped form the background for decisions on the Manhattan Project, the use of radar, the development of penicillin manufacture, better utilization of scientific personnel, and later the rationing of penicillin along with other numerous problems which the war brought with it.

Dr. Harrison modernized the Divisions of the National Research Council, extended both their freedom of action and their scope, and developed a remarkably harmonious esprit de corps in the whole group. His quiet ease of manner during unsettled times served as an example of non-hurried and unflurried weighing of the matters involved in making crucial decisions. When he retired from the chairmanship in 1946, the Executive Board of the Academy–Research Council paid tribute to him in the following words:

> Dr. Ross G. Harrison • • • has served the Council through a long and turbulent period during which problems of far-reaching import and of great complexity have had to be met. He has supported, stimulated, and guided the divisional chairmen in their efforts to advance human welfare through the various Natural Sciences; he has brought this

Council into amicable working relationship with the Council of Learned Societies and the Social Science Research Council; he has been responsive to calls from civilian agencies and to the many requests and needs from military and other divisions of the Government. These numerous, wisely rendered services form a notable contribution to Science and the Nation.

With characteristic humility Dr. Harrison cited in response the unfailing cooperation he had enjoyed from his associates in the Academy–Research Council. "It is easy," he wrote, "to work effectively when one finds such cordial response and such willingness to sink minor differences of opinion for the common end."

STUDY OF AFRICA SOUTH OF THE SAHARA

The Academy–Research Council's study of Africa south of the Sahara (*see* NEWS REPORT, Vol. IX, No. 1, p. 7, 1959) was officially completed on September 18, 1959, with the transmittal to the International Cooperation Administration (ICA), of a report entitled "Recommendations for Strengthening Science and Technology in Selected Areas of Africa South of the Sahara" and its "Appendices" (*see* New Publications, p. 99).

The Steering Committee, under the chairmanship of W. Albert Noyes, University of Rochester, provided general guidance to the Executive Director, J. George Harrar, Vice President of the Rockefeller Foundation, in the preparation of this report and exercised final responsibility for its content. The survey and recommendations include medical and public health services; agriculture; natural resources (renewable and nonrenewable); engineering, technology, and industry; and broad aspects of education.

The contract with ICA has been extended to the end of the current fiscal year so that the advisory services of the Academy–Research Council may be called upon during the initial implementation stages of the various recommendations set forth in the report. The Academy–Research Council will also counsel ICA on other aspects of science and technological assistance. An advisory committee to replace the present Steering Committee is now being appointed to carry out this phase of the program.

CONFERENCE ON ELECTRICAL INSULATION

The twenty-eighth annual meeting of the Conference on Electrical Insulation was held at Pocono Manor Inn, Pocono Manor, Pa., October 26–28, with 188 members and guests in attendance.

In the course of the three-day meeting, 25 technical papers were presented at the 5 technical sessions. Roundtable discussions were held on *a*) Dielectric Breakdown of Solids—Measurement and Theory, *b*) Current Trends in Dielectric Properties Requirements, *c*) Electrical Insulation Problems Related to High Temperatures, and *d*) Fundamental Aspects of Dielectric Properties of Polymers.

Following the first technical session on Monday morning, October 26, S. O. Morgan of the Bell Telephone Laboratories, Inc., presented the fifth Whitehead Memorial Lecture at 11:00 a.m. on the subject of "The Contribution of Chemists to Dielectrics." The guest speaker for the Conference Banquet which was held on Tuesday evening, October 27, was George L. Haller of the General Electric Company.

At the business meeting the following officers were nominated for the 1960 Conference: W. McMahon, Bell Telephone Laboratories, Inc., at Murray Hill, N. J., *Chairman;* S. I. Reynolds, General Electric Research Laboratory at Schenectady, *Vice Chairman;* and Philip J. Franklin, Diamond Ordnance Fuze Laboratory at Washington, D. C., *Secretary.* The 1960 annual meeting of the Conference will be held at the National Bureau of Standards, Washington, D. C., October 17–19.

VISITING FOREIGN MATHEMATICIANS

The Division of Mathematics has announced the appearance of its annual list of Visiting Foreign Mathematicians. The list includes information about mathematicians and statisticians who are spending some part of this academic year in the United States and gives the home country of each, the dates of their visit, and the name of the host institution. Copies are available upon request from the Division of Mathematics, Academy–Research Council.

FREQUENCY REQUIREMENTS FOR RADIO ASTRONOMY

The need for international protection of certain radio frequency ranges for use by radio astronomers was the subject of a meeting called by the Academy–Research Council on October 16. During the morning, a group of the nation's leading radio astronomers and representatives of scientific societies concerned met to discuss and agree upon the minimum basic frequency requirements needed for the continuing development of world astronomy through use of the radio spectrum.

Allocation of the entire range of radio frequencies—from the relatively long waves of the standard radio broadcasting transmitter to the ultra-high frequency waves used in radio navigation and space communication—is now being discussed at the international Administrative Radio Conference in Geneva by delegations from the United States and 83 other national members of the sponsoring International Telecommunication Union. It was the unanimous feeling of the astronomers meeting at the Academy–Research Council that decisions made in Geneva would determine for years to come the scope and detail of man's view of the universe.

In this regard, the astronomers present agreed unanimously that they were in substantial accord with proposals already made by the International Astronomical Union and the International Scientific Radio Union, which were based, in turn, largely upon recommendations previously made by the International Radio Consultative Committee for the protection of radio astronomy frequencies.

These proposals would set aside certain portions of the radio frequency spectrum for the use of radio astronomers alone. On these wave lengths transmissions would be restricted everywhere on earth and from vehicles launched from the earth. So sensitive are the listening devices used by radio astronomers to detect radiations from outer space that complete radio silence in these wave lengths is required for the fullest effectiveness of radio telescopes.

All man's knowledge of the universe, the astronomers pointed out, is obtained by the observation of some form of radiation. Before the advent of radio astronomy, our observations were limited to the study of the visible radiation from stars and planets. Now, because of the new ability to study additional properties of celestial bodies by their radio emanations, they said, a new window had been opened to us. Only by the provision of suitable frequency space, they felt, can a proper utilization of these opportunities be realized.

The radio astronomers felt that the position taken by the United States delegation at Geneva, which would give international protection to only one frequency band, that surrounding the hydrogen emission line at 1420 megacycles/second, was totally inadequate to meet the immediate and foreseeable needs of radio astronomy.

At an afternoon session, the astronomers were joined by representatives of the U. S. Government agencies which are responsible for frequency allocations to both governmental and non-governmental users in this country, in order that mutual discussion might clarify the needs of radio astronomy for adequate allocations. These included representatives of the Department of State, the Office of Civil and Defense Mobilization, the Federal Communications Commission, and the Department of Defense.

Out of the meeting came an agreed statement by the radio astronomers of their needs, a useful exchange of views with regard to the needs and the difficulties, and an agreement to establish an ad hoc working group of radio astronomers and governmental officials to explore immediate steps that might be taken to strengthen the position relative to radio astronomy of the United States delegation at the Administrative Radio Conference then in progress in Geneva.

Next day, October 17, after day-long discussions, this ad hoc working group agreed upon certain desirable modifications to strengthen a resolution that the United States delegation was already considering introducing at Geneva, seeking "resolution status" for a series of frequencies for radio astronomy. Such status would express the agreement of the participating nations with the desirability of providing for the use of these frequencies for radio astronomy but would not reserve them by international

treaty. The working group recognized that the resolution even as strengthened, would fall far short of meeting the full needs of radio astronomy as defined at the meeting of October 16, but they welcomed the resolution as an important step forward.

The agreement reached by the working group was subsequently reviewed by the Interdepartment Radio Advisory Committee of the Government and with a few modifications became the basis for a resolution proposed to the Administrative Radio Conference in Geneva, by the United States delegation on October 22. The entire matter continues under discussion at the Conference.

While the action taken by the United States delegation leaves a great deal to be achieved before the needs of radio astronomy can be satisfied, the delegation feels that the resolution introduced represents an important "foot in the door." Internal United States problems with regard to allocations for radio astronomy will need to be settled before the United States can play its full part in the international agreements that must ultimately be reached.

COMMITTEE ON SPACE RESEARCH

The Bureau of the International Council of Scientific Unions (ICSU) has approved a new charter for the Committee on Space Research (COSPAR). Thus, the group which was established by ICSU in October 1958 for a period of one year has been given permanent status.

COSPAR is a non-governmental group having the objective of coordinating scientific research internationally in the field of rockets and satellites. It met for the first time in London in November 1958. At its second meeting, held in The Hague in March 1959, it was unanimously agreed to revise the composition of the Committee, which had encountered objections from one of the original members of COSPAR—the Academy of Sciences of the U.S.S.R. The revision now approved by ICSU was adopted in Amsterdam, November 13, at a meeting of the full COSPAR Executive Committee.

Under the new COSPAR charter, national membership is open to all national members of ICSU that are actively engaged in space research and to those international scientific unions that are scientific members of ICSU and signify their desire to participate in the work of COSPAR. Nine of the Unions have been accepted as charter members.

The Executive Council of COSPAR will consist of nine Union representatives and a seven-man Bureau composed of a President, two Vice-Presidents, and four additional elected members. One of the two Vice-Presidents will be chosen from a slate presented by the National Academy of Sciences of the United States and the other will be chosen from a slate presented by the Academy of Sciences of the U.S.S.R. The four additional members will be chosen in equal numbers from lists prepared by the two Vice-Presidents.

Elections will take place on January 8 and 9, 1960, in Nice, France, when COSPAR meets for the first time under its new charter. At the same meeting, definitive composition of Working Groups, which have been functioning in provisional form, will be decided.

Also at Nice, from January 11 to 15, the First International Space Science Symposium will be held. The provisional program for the Symposium presently includes 85 scientific papers from 9 countries. Approximately 250 scientists from 14 countries will participate.

The Symposium will deal with all scientific problems that fall within the scope of the COSPAR charter, including meteors, magnetic fields, ultraviolet radiation, tracking, telemetering, radiation belts, and orbital variations. Participation of American scientists in the Symposium is being coordinated through the Space Science Board of the National Academy of Sciences.

THE USE OF MODELS IN FIRE RESEARCH

The Committee on Fire Research and the Fire Research Conference held an international symposium on the use of models in fire research at the Academy–Research Council building on November 9 and 10. The symposium was attended by representatives of government agencies, universities, private research organizations, industry, and insurance companies and associations,

as well as the following invited foreign participants:

J. G. Dawes, Safety in Mines Research Establishment, Sheffield, England
J. Faure, Laboratoire National d'Hydralique, Chatou, France
Tosiro Kinbara, University of Tokyo, Tokyo, Japan
Gert Magnus, Technische Hochschule, Karlsruhe, Germany
G. W. Shorter, National Research Council, Ottawa, Canada
G. I. Taylor, Cambridge University, Cambridge, England
P. H. Thomas, Joint Fire Research Organization, Boreham Wood, England
S. Yokoi, Building Research Institute, Ministry of Construction, Tokyo, Japan

H. C. Hottel of the Massachusetts Institute of Technology served as chairman of the opening session on modeling principles. Following the address of welcome by S. Douglas Cornell, Executive Officer of the Academy–Research Council, Professor Hottel presented the background and functions of the Committee and Conference and summarized the purpose of the symposium as follows:

The symposium will be concerned with the use of models in predicting fire behavior on a large scale. Modeling, applied with considerable success to many combustion problems, has had almost negligible application in studying fire growth and spread. It should be a potent tool, but the problem is extremely complicated because of the enormous number of variables. In this symposium the status of our limited knowledge of fire modeling will be reviewed and the design of experiments to determine which dimensionless groups of variables may be ignored and which must be faithfully reproduced in the model will be considered. The status and future potential for progress through employment of mathematical models of the fire-spread problem will also be explored.

William H. Avery of the Johns Hopkins Applied Physics Laboratory presided over the afternoon session on liquid surface model fires, and A. A. Brown of the U. S. Forest Service presided over the evening session on full-scale case studies and tests. The morning session of the second day was devoted to aerodynamics of fires with Howard W. Emmons, Harvard University, presiding; and the afternoon session was devoted to experimental techniques with Walter T. Olson of the National Aeronautics and Space Administration presiding.

Abstracts of the papers which were presented will appear in the January issue of *Fire Research Abstracts and Reviews*. Complete transcripts of the papers and the discussions will be printed in the proceedings of the symposium.

BUILDING RESEARCH INSTITUTE FALL CONFERENCES

Nearly 900 people from all fields of building science and the related professions attended the Fall Conferences of the Building Research Institute, November 17–19, at the Shoreham Hotel, Washington, D. C. The first of the Institute's new multi-subject conferences, the meeting featured programs on *1*) sandwich panel design criteria, 2) design potential of metal curtain walls, 3) new methods of heating buildings, *4*) the current status of modular coordination, 5) building research international, and *6*) a workshop of building research. The last named was a two-day session divided into three parts: *1*) problems with component construction, 2) proposals for new building research, and 3) documentation of building science literature.

The meeting presented speakers from Canada and South Africa, and there were a large number of delegates from England, Australia, and Russia, as well as Canada.

The program on sandwich panel criteria was the most comprehensive of the three-day meeting; it consisted of two full days of prepared papers and discussion, supplemented by a full day of individual workshop activities by four groups concentrating on roofs, interior partitions, exterior non-load-bearing walls and exterior load-bearing walls respectively.

The Proceedings of the meeting will be published in several separate documents and distributed by the Building Research Institute to all those registered at the conferences, to each of the official representatives of its member companies, and to all other Institute members on request. Some of the documents will be sold by the Publications Office of the Academy–Research Council.

The Building Research Institute is planning to hold its next conference of this type at the Hotel Statler-Hilton in New York, April 5–7, 1960.

CHAIRMANSHIP OF DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH

Augustus B. Kinzel, Vice President-Research, Union Carbide Corporation, has succeeded to the chairmanship of the Division of Engineering and Industrial Research following the sudden death of Division Chairman Vice Admiral Edward Lull Cochrane, USN (Ret.) early in November.

Admiral Cochrane long active in Academy–Research Council work had served only since January 1959 as Chairman of the Division. Heeding medical advice he had asked to be relieved of the chairmanship at a convenient time. Dr. Kinzel had been formally appointed Chairman Designate with January 1, 1960 as the planned date for relieving Admiral Cochrane.

Admiral Cochrane served also as Chairman of the Maritime Cargo Transportation Conference and participated most actively in the Maritime Research Advisory Committee, both of which are sponsored jointly by the Division of Physical Sciences and the Division of Engineering and Industrial Research. Another of his interests and activities was the Committee on Undersea Warfare of the Division of Physical Sciences.

Dr. Kinzel, the new Chairman of the Division, has received many honors in recognition of his performance, direction, and organization of research, particularly in metallurgy. He has held membership on a number of committees and boards of the Academy–Research Council; is Past Chairman and a member of the Naval Research Advisory Committee; a member of the Defense Science Board, a director of the Mitre Corporation, Past President of the American Institute of Mining, Metallurgical and Petroleum Engineers; Past Chairman of the Welding Research Council; member of Massachusetts Institution of Technology Corporation; and President-Elect of the Engineers' Joint Council. He has been with the Union Carbide Corporation since 1926. His research contributions cover a wide range of activities in the fields of metallurgy, stainless steels, structural low-alloy steels, ferroalloys, industrial gases, and atomic energy. He has been an effective advocate of increased basic research and successful in integrating research activities with commercial interests.

SYMPOSIUM ON CENTRAL NERVOUS SYSTEM CONTROL OF CIRCULATION

Under the auspices of the Committee on the Cardiovascular System, a Symposium on the Central Nervous System Control of Circulation was held in Washington, November 1–3. This was the first event of a three-year program undertaken by the Committee, with the support of the National Heart Institute, to stimulate interest in research in this long-neglected interdisciplinary field.

While some work was being done in this area by American scientists before the war, it lapsed and has never been resumed to any significant extent with the result that textbook discussions are based on a limited number of papers published long ago. Studies of the dynamics of circulation and of functions of the nervous system have flourished, but the necessary integration of the two fields has not occurred. Recently a few European investigators have set out to bridge the gap and have made interesting observations on the nervous control of vasomotor reactions, the role of hypothalamic and medullary centers, and the regional modification of blood flow in the absence of generalized circulatory changes.

Taking advantage of these foreign developments, the Committee invited eight European scientists to participate in the symposium and share their findings and concepts with the 27 American speakers and discussants, before a total audience of some 150 persons. It is hoped that the keen interest aroused will result in a renaissance of research on these programs; the Committee plans to hold another symposium in 1960 and looks forward to hearing reports of significant new work in this field.

Complementing this approach, the Committee proposes also to encourage the preparation of critical reviews of the subject and to seek support for young investigators who may be stimulated to enter the field and obtain the necessary training in both neural and circulatory physiology.

JOINT MEETING OF RADIO SCIENTISTS AND RADIO ENGINEERS

The U. S. National Committee of the International Scientific Radio Union (URSI) and the Institute of Radio Engineers' Professional Groups on Antennas and Propagation, Circuit Theory, Information Theory, and Microwave Theory and Techniques held their joint fall meeting at the El Cortez Hotel, San Diego, Calif., October 19–21. In the course of the 3-day meeting 80 papers were presented at 14 technical sessions to the 350 registrants. The majority of papers dealt with problems associated with the propagation of electro-magnetic waves; the others, for the most part, were theoretical or experimental papers on rf components and techniques.

Papers on tropospheric propagation included atmospheric refraction and scatter for line of sight and over the horizon conditions, and terrain return. Propagation via the ionosphere was discussed for the D, E, and F regions and for meteor trails. Physical properties of the ionosphere as observed by rocket and satellite techniques were disclosed. Whistlers and sferics were reviewed in the light of both old and new data.

Other sessions were devoted to the theory and techniques used in the design of microwave antennas, detectors, and receivers. Theoretical papers were presented on information theory, circuit theory, filters, and electromagnetic boundary value problems.

The combined technical session on Monday afternoon, October 19, featured reports on recent symposia partly sponsored by URSI. The Tuesday evening session was a panel discussion of radar astronomy. At the luncheon meeting on Wednesday, October 21, Professor Harold C. Urey of the University of California at La Jolla spoke on "The Problem of the Origin of the Solar System."

In conjunction with the scientific sessions the U. S. National Committee of URSI and Commissions 1, 2, 3, 4, and 6 held business meetings to discuss plans for United States participation in the XIIIth General Assembly of URSI to be held in Great Britain, September 5–15, 1960.

Plans were also made for future joint meetings. The spring meeting will be held in Washington, May 2–5, 1960, as has been the custom. The invitation of the National Bureau of Standards to meet at the Boulder Laboratories was accepted and the date of the meeting was set for December 12–14, 1960.

STAFF APPOINTMENTS

The Office of Scientific Personnel announces the appointment of **Charles L. Koelsche** as Special Assistant to the Director to make a survey of apparatus for science teaching in South and Southeastern Asia. The study is being carried out under a grant from the Ford Foundation. Dr. Koelsche received his doctorate in education from Indiana University in 1953; his predoctoral work was in chemistry and physics at the University of Southern California. During the past year, he was a specialist for secondary school science in the U. S. Office of Education and completed several studies in the field of science education, including a 7-state research project on science facilities and equipment.

The Prevention of Deterioration Center announces the appointment of **Robert G. Lyle** as a Research Assistant effective November 16. Mr. Lyle received his training in mechanical engineering at the University of Pittsburgh, and prior to joining the staff was a lieutenant in the U. S. Coast Guard. His duties at the Center will include studies of the effects of the induced environments upon the deterioration of materials and equipment.

George W. Baker has been appointed Technical Director of the Disaster Research Group effective November 1 to succeed **Harry B. Williams** who has accepted the position of Assistant Director for Mental Health with the Southern Regional Education Board in Atlanta, Ga. Dr. Baker, who received his Ph. D degree in sociology from the University of North Carolina in 1952, has been engaged in full-time research since 1951. He was with the U. S. Air Force until 1957 and was employed as a team chairman by American University in 1957–58.

Harry L. Hewes joined the Building Research Institute staff in July as a professional writer. Over the last 7 years, Mr. Hewes has had special assignments with both the Building Research Advisory Board and the Building Research Institute since his retirement from the Housing and Home Finance Agency of the Federal Government.

Mr. Hewes has had an extensive newspaper career, including accredited foreign service. His present duties will include work on such publications as the Building Science Directory, Building Science Abstracts, and Building Science News; in addition he will handle publicity and press relations for the Institute.

RECORD OF MEETINGS

September	
1	AASHO Road Test, National Advisory Committee, *Ottawa, Ill.*
2	Committee on Urban Research, *Chicago*
2–3	Titanium Alloy Sheet Rolling Panel
4	U. S. National Committee, International Union of Biological Sciences
7	Subcommittee on Carcinogenesis
8	Technical Committee for High Energy Physics
9	Building Research Institute, Programs Committee
	Committee on Textile Fabrics, *New York City*
10	Planning Committee on Paints and Coatings in Buildings
	Department of Defense Standing Review Committee on Organic Materials
	Committee on Rigid Pavement Design, Subcommittee on Continuous Steel Reinforcement
	Committee on Bio-Astronautics, Panel on Identification of Long-Range Problems
11	Building Operation and Maintenance Study Group, *Detroit*
	Subcommittee on Water Supply
13	Subcommittee on Nomenclature of Inorganic Chemistry, *Atlantic City*
14–15	Panel on Properties of Solid Surfaces and Interfaces, *Chicago*
15	Committee on Nomenclature (Chemistry), *Atlantic City*
	Ad hoc Committee on Composite Pavements, *Columbus, Ohio*
	Committee on Oceanography
16	Plastics Study Group, Planning Committee, *New York City*
17	Agricultural Research Institute, Finance and Budget Committee, *Chicago*

September	
17	Subcommittee on Food Sanitation
17–18	Building Research Advisory Board, Technical Studies Advisory Committee
	Highway Research Board, Workshop Conference on Economic Analysis in Highway Programming, Location, and Design
18	AASHO Road Test, Steering Panel, *LaSalle, Ill.*
21	Federal Construction Council, Task Group on High Temperature Hot Water Systems
	Committee on Bio-Astronautics, Panel on Bio-Engineering of Protective Systems, *Bad Aachen, Germany*
22	Committee on Prosthetics Education and Information
24	Committee on Perspectives in Materials Research
24–25	Committee on Economic Factors in Graduate Study, *Oakland, Md.*
	Committee on Aircraft and Astronautics, Sub-group on Propulsion and Auxiliary Power, *Sacramento*
25	Committee on Plastics and Elastomers, *Natick, Mass.*
27	Agricultural Research Institute, Finance and Budget Committee, *Chicago*
28	Federal Construction Council, Task Group on High Temperature Hot Water Systems
29	National Science Foundation Postdoctoral Fellowship Evaluation Committees
	Panel on Electronics, *Dayton*
29–30	Committee on Aircraft and Astronautics, Sub-group on Structures and Airframes
	Committee on Milk, *Chicago*

September	
30	National Science Foundation Post-doctoral Fellowship Evaluation Board
	Ad hoc Committee on Medical Microbiology
October	
1	Committee on Aircraft and Astronautics, Sub-group on Communications and Guidance
5	Committee on Atmospheric Sciences
	Federal Construction Council, Task Group on High Temperature Hot Water Systems
6	Committee on Fats and Oils
6–7	Food Protection Committee, *St. Helena, Calif.*
7	Subcommittee on Plasma
8	Committee on Shock
	Committee on Biological Effects of Atomic Radiation
	Planning Committee on Usage of Doors in Buildings
9	U. S. National Committee, International Geographical Union
	Division of Biology and Agriculture, Executive Committee
10	Ad hoc Committee on International Relations in Biophysics
	Committee on Geography, Advisory to the Department of State
	Division of Earth Sciences, Executive Committee
11	National Academy of Sciences–National Research Council, Governing Board
	Agricultural Research Institute, Governing Board
12–13	Agricultural Research Institute, Eighth Annual Meeting
	Department of Defense Standing Review Committee on Metallic Materials, *Palo Alto, Calif.*
12–14	Eighth National Conference on Clays and Clay Minerals, *Norman, Okla.*
13	Subcommittee on Thermal Factors in Environment
14	Federal Construction Council, Operating Committee
15–16	Conference on the Chemistry of Natural Products and Organic Reaction Mechanisms, *Natick, Mass.*
16	Conference on Radio Astronomy
	AASHO Road Test, Statistical Panel, *Ottawa, Ill.*
16–18	Committee on Oceanography, *Pasadena, Calif.*
17	Subcommittee on Thrombosis and Hemorrhage
	Committee on Nutritional Studies at Elgin State Hospital, *New Orleans*
19	Committee on the Skeletal System

October	
19	Ad hoc Committee on Astronomy
19–20	Conference on Beef for Tomorrow, *Lafayette, Ind.*
	Space Science Board, Ad hoc Rocket Study Committee
19–21	U. S. National Committee, International Scientific Radio Union, and Institute of Radio Engineers, Joint Meeting, *San Diego, Calif.*
	Conference on Safety to Life from Fire in Elementary and Secondary Schools
20	Committee on Ship Structural Design
20–21	Materials Advisory Board
22	Committee on Tissue Transplantation
	Committee on Aircraft and Astronautics, Sub-group on Pneumatics, Hydraulics, and Launch Complex, *St. Louis*
24–25	U. S. National Committee, International Union Against Cancer
26	Subcommittee on Waste Disposal
	Committee on Hearing and Bio-Acoustics, Executive Council
	Titanium Sheet Rolling Panel, Alloy Selection Group
26–28	Conference on Electrical Insulation, *Pocono Manor, Pa.*
27–28	Armed Forces–National Research Council Committee on Hearing and Bio-Acoustics
	Refractory Sheet Rolling Committee
28	Committee on International Nutrition Programs
	Committee on Infant Nutrition, *New York City*
29	Committee on Radiation Preservation of Food, *Chicago*
	Organizing Committee for Fifth International Congress on Nutrition
	U. S. National Committee, International Union of Nutritional Sciences
	Food and Nutrition Board, Executive Committee
	Committee on Cereals
29–30	Advisory Committee on Protective Casings for Wells and Suction Lines
29–November 1	Committee on Geography, Advisory to the Office of Naval Research, *Highland Park, Ill.*
30	American Miscellaneous Society, Special Moho Committee
	Women's Committee for Fifth International Congress on Nutrition
30–31	Food and Nutrition Board
31	Meeting on Low Level Effects of Atomic Radiation
	Committee on Recommended Dietary Allowances, Subcommittee on Calcium

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National Research Council. Committee on Atmospheric Sciences. *Proceedings of the Scientific Information Meeting on Atmospheric Sciences . . . November 24, 1958.* Washington, 1959. (NAS–NRC Publication 710.) 105 p.

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Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES

Annual Meeting, Washington, D. C., April 25–27, 1960

NATIONAL RESEARCH COUNCIL

Annual Meeting, Washington, D. C., March 24–26, 1960

NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., February 7, 1960
Governing Board, Washington, D. C., April 24, 1960
Governing Board, Washington, D. C., June 12, 1960

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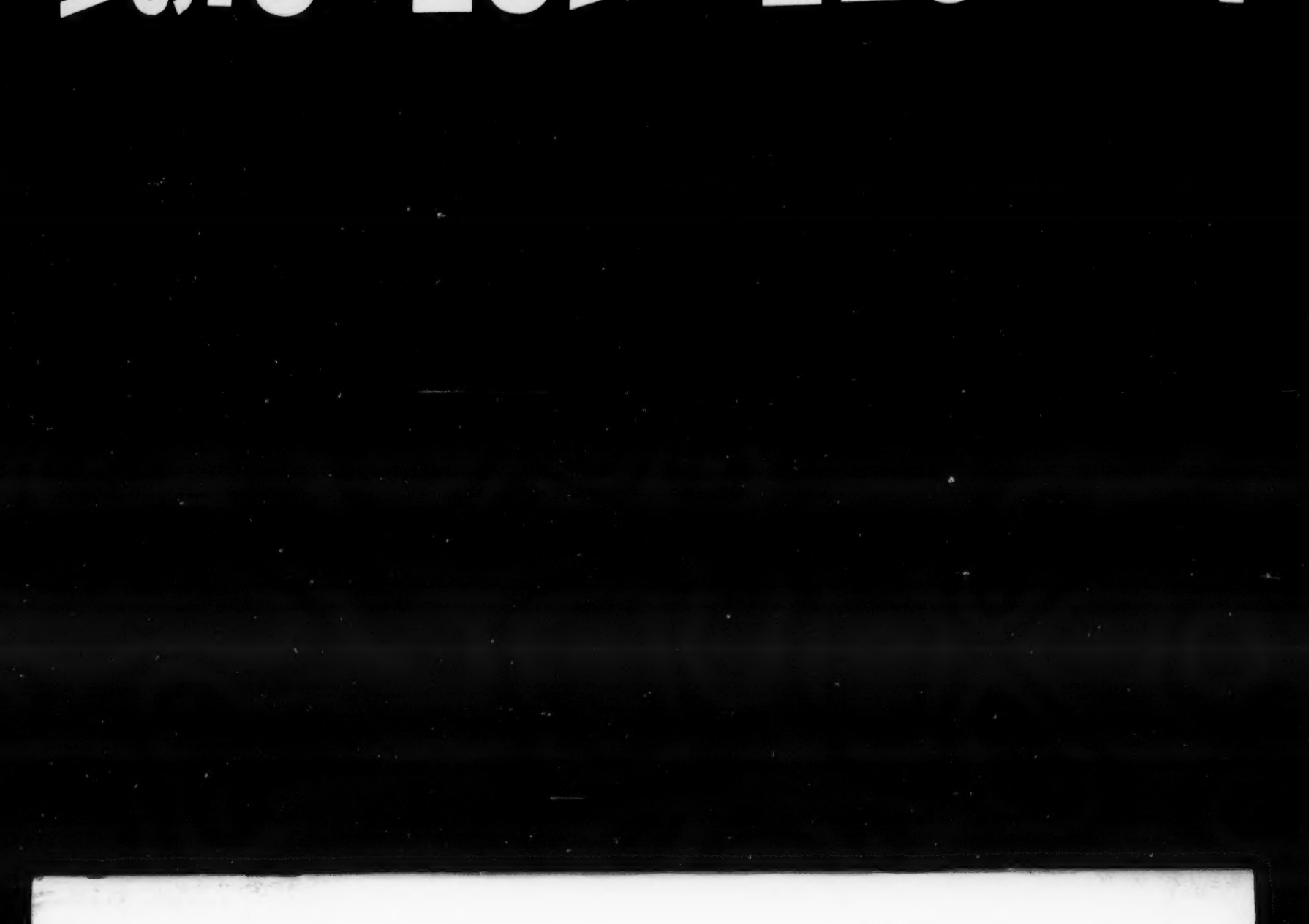
The search for Truth is in one way hard and in another easy. For it is evident that no one can master it fully nor miss it wholly. But each adds a little to our knowledge of Nature, and from all the facts assembled there arises a certain grandeur.

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